



Global FinPrint Basic BRUVS protocol

Baited remote underwater video systems (BRUVS) consist of a compact video camera (typically a GoPro-Hero 3/4) that is mounted on a metal or weighted PVC frame that has a bait-source mounted on a pole extending ~ 1.25-1.5 m into the camera's field of view (Figure 1). Baits consist of oily fish that is chopped into small chunks, crushed up, and then weighed out to 1 kg and placed in some sort of container or cage that allows the scent to escape but protects the bait chunks. Care should be taken to ensure that this container is securely fastened to the frame so as to be able to withstand shark bites without being torn away.

BRUVS should be set in random locations within the defined study area. The study site boundary will be usually determined by the operational range of the sampling vessel from the home base of the researchers (e.g., a field station, dive shop or other central location). Global FinPrint sampled reef areas of ~ 10 km² with 40-50 BRUVS deployments, usually made over ~ 3-7 successive days. Sampling points should be chosen by using a coordinate generator to produce latitude and longitude points within the defined boundary of the study site from a map constructed using ArcGIS software or Google Earth Pro. Optimally you should generate all sampling points randomly and then group them to ensure that none are simultaneously deployed within 500 m of one another to ensure that they are independent replicates. Global FinPrint sampled depths from 2-40 m and focused on hard bottom reef substrate or soft substrates intermixed with hard bottom.

BRUVS are deployed in these randomly selected locations during daylight hours (07:00-17:00). Upon arrival at the randomly selected coordinate BRUVS are lowered from the boat using a rope and guided by an in-water personnel (snorkeling) to orient the unit facing down current, ensuring that the unit does not touch live coral, and has a clear field of view. The BRUVS are left for at least 70 minutes, allowing it to film continuously for ~ 60 min after settling to the bottom. Soak times of 60 minutes have been shown to be adequate for the detection of the most common reef species, but it may be necessary to set for 90 minutes to detect rare species. Units are manually retrieved after the

deployment using the rope, which terminates in a small marker float to facilitate relocation. At both the start and end of each deployment environmental variables are measured including where possible current speed and direction, bottom depth, underwater visibility, surface water temperature, salinity, pH, and dissolved oxygen. A latitude and longitude of the actual sampling point is taken, as there is likely to be some deviation from the original random coordinate. During one sampling day it is possible to switch camera batteries, SD cards, and baits from each camera/frame unit to achieve multiple deployments. A set of 4 frames can usually be set up to 3 or 4 times daily to obtain 12 to 16 replicate 60 minute sets.

For Global FinPrint we used a minimum of 2 trained people to “annotate” the 60-minute video files (i.e., time-logging all shark and ray sightings during the 60-minute period after the unit settled on the seafloor). Experienced observers made all species-level identifications. We determined MaxN for every species or species group, which is an index of relative abundance representing the maximum number of individuals of each species seen on any given frame of a BRUVS set. This parameter is the standard reporting metric for BRUVS that avoids double counting the same individual should they leave the field of view and return. MaxN has been shown to have a linear relationship to the metric MeanCount, which in turn has shown to scale with true abundance. While MaxN exhibits hyperstability (i.e. counts remaining high as true abundance decreases) this is primarily an issue at very high true abundances (> 20 individuals), which is rarely encountered when sampling sharks. “Unknown shark” and “unknown ray” species identification can be assigned when the species identity cannot be visually determined, which usually occurs because the sighting is far in the background of the field of view. Unknowns should only be counted when there are no other sightings of the taxon on the BRUVS. If there are sightings of an identified shark or ray on the BRUVS together with an unknown, it is advisable to conservatively assume that the “unknown” is the same identified individual.

Please see the Global FinPrint publications page for more details on our methodology and tips on how BRUVS should be set.

<https://globalfinprint.org/findings/index.html>



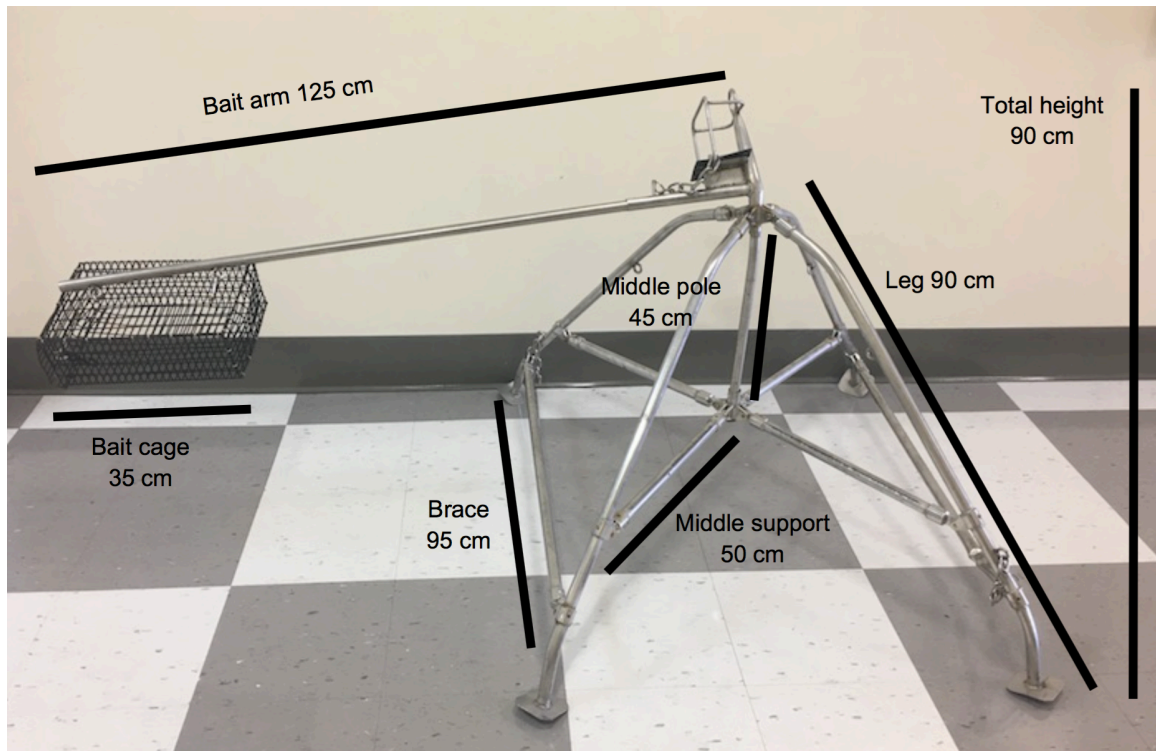


Figure 1: Dimensions of the single camera BRUVS frame used in Global FinPrint surveys. Two-camera (stereo) BRUVS were also used (see <https://www.aims.gov.au/docs/research/monitoring/seabed/video-monitoring.html>)

